public mind on such matters, this enormous waste will continue, and in all probability increase.

It cannot escape observation that for many years past farmers, fruit-growers, and others have annually implored action, but it would seem that the very people who should have been primed with accurate information, and able quickly and decisively to have remedied the situation, are rather disabled than qualified for work of this character, which is of vital importance to the nation, and calls for immediate action.

Walter E. Collinge.

NOTES.

We learn from the "Political Notes" in the *Times* that Lord Balfour's Committee on After-War Trade has been strengthened by the addition of Sir William Pearce, Sir Charles Henry, Sir Archibald Williamson, and Sir William Priestley. The committee is now investigating the question of the possible introduction of the metric and decimal systems for our coinage, weights, and measures.

While the wastage of the Yorkshire cliffs is to be deplored, the result is sometimes of advantage to the geologist and antiquary. Recently, in the vicinity of Scarborough, a fall of the cliff has revealed a hoard of twenty bronze weapons, which consisted of battle-axes, spears, chisels, gouges, portions of a sword, etc. Twelve of the axes, of the socketed type, are perfect. One shows the unusual feature of a rivet-hole in place of a loop for secure hafting; another contained a portion of the original wood shaft. Some of the axes are in the rough state, as if just turned out of the mould; others have obviously been in use. The collection evidently formed the stock-in-trade of a metal-worker of the Bronze Age, at least a thousand years before the Christian era. Mr. T. Sheppard, who has made a special study of the relics of this period, is figuring and describing the specimens, which have found a permanent home in the museum at Hull.

Until recently our supplies of acetone, of which enormous quantities are now required in the manufacture of propellent explosives, have been largely obtained from foreign countries, where cheap supplies of waste wood were available for destructive distillation for acetone production. Since the outbreak of war, however, this position has been radically altered, and acetone is now produced in this country on a large scale by the distillation of wood and in other ways. The question is also being taken up in other countries of the Empire; it is proposed, for instance, to erect a factory for this purpose in Natal, where wattle wood will be used as a raw material. The possibility of similarly utilising the wattle wood accumulated in connection with the wattle bark industry of the East Africa Protectorate is also under consideration, and at the Imperial Institute an exhaustive series of trial distillations with this wood, and also with olive wood from the same protectorate, used locally as fuel, has just been concluded. The results show that the yield of acetone and acetic acid from both woods is satisfactory. A good yield of acetic acid is also being obtained in Ceylon from the distillation of coconut shells and various local woods. Attention is also being given to the subject in the Indian State of Mysore, and it seems likely that in a short time the Empire will be able to produce all the acetone and acetic acid it requires.

The death is announced, in his seventy-ninth year, of Dr. H. B. Wheatley, who was clerk to the Royal Society from 1861 to 1879, and assistant secretary to the Royal Society of Arts from 1879 to 1908.

We regret to see in the *Morning Post* of April 27 the announcement of the death of Sir Marc Ruffer, president of the Sanitary, Maritime, and Quarantine Council of Egypt, and formerly director of the British Institute of Preventive Medicine—now the Lister Institute.

The *Nieuwe Courant* announces the death of Prof. Morjan Raciborski, professor of botany in the University of Cracow, and formerly for many years engaged in work on sugar-cane and tobacco in the Buitenzorg Botanic Gardens, Java.

The valuable material collected by the special commission appointed to investigate the flora, fauna, and hydrology of Lake Baikal is to be published by the Imperial Academy of Sciences, Petrograd, in one volume, of which an edition of five hundred copies will be issued.

We regret to note that *Engineering* for April 27 records the death of Mr. Andrew S. Biggart, in Glasgow, on April 26. Mr. Biggart was associated with the late Mr. William Arrol for thirty-four years, and took a prominent part in the construction of the plant used in connection with the Forth Bridge. He was a member of the Institution of Civil Engineers, and was noted for his interest in his workers. His death will be regretted by many who have benefited by his philanthropic schemes.

At a meeting held at the Institute of Chemistry on April 27, the president and council presented a silver rose bowl to Mr. R. B. Pilcher, registrar and secretary, in appreciation of twenty-five years' faithful service. The meeting was well attended, and the presentation was made by the president, Sir James Dobbie, principal of the Government laboratories. Mr. Pilcher, who joined the staff of the Institute as clerk in 1892, was appointed assistant secretary in 1894, secretary in 1895, and has held the joint offices of registrar and secretary since 1900.

It is announced that the next triennial prize of 300*l.* under the will of the late Sir Astley Cooper will be awarded for an essay or treatise on the subject of "Gunshot Wounds of the Lungs and Pleura." Candidates (who must not be members of the staffs of Guy's or St. Thomas's Hospitals, or their relatives) must send their essays, written in English, addressed to the physicians and surgeons, Guy's Hospital, London, S.E., on or before January 1, 1919. Full particulars concerning the conditions of the competition are obtainable from Mr. C. H. Fagge, Guy's Hospital.

The sixteenth biennial Dutch Congress of Natural and Medical Sciences was held at The Hague on April 12 and following days. In connection with this, the geography section had organised an interesting historical exhibition, mainly of the work of Mercator and the Dutch cartographers of the seventeenth century. The chief general lecture was delivered by Prof. H. A. Lorentz, of Leyden, on "Einstein's Gravitational Theory and Fundamental Ideas in Physics." From a discussion, in one of the sections, on chemical industry in Holland, it appears that the manufacture of aniline and other intermediate materials for the dye industry was started in 1916.

The annual meeting of the members of the Royal Institution was held on May 1, the Duke of Northumberland, K.G., president, in the chair. The annual report of the Committee of Visitors for the year 1916, testifying to the continued prosperity and efficient management of the institution, was read and adopted. Sixty-two lectures and nineteen evening discourses were delivered in 1916. The following gentlemen were unanimously elected as officers for the ensuing year:—*President*, the Duke of Northumberland; *Treasurer*, Sir James Crichton-Browne; *Secretary*, Col. E. H. Hills; *Managers*, H. E. Armstrong, Sir W. Phipson Beale, Bart., C. V. Boys, J. H. Balfour Browne, J. Y. Buchanan, W. A. B. Burdett-Coutts, Sir J. Mackenzie Davidson, D. W. C. Hood, the Rt. Hon. Viscount Iveagh, Sir Charles Nicholson, Bart., the Hon. R. C. Parsons, Sir James Reid, Bart., Alex. Siemens, S. West, and the Rt. Hon. Lord Wrenbury; *Visitors*, Ernest Clarke, J. F. Deacon, E. Dent, Lt.-Col. H. E. Gaulter, J. Dundas Grant, W. B. Gibbs, W. A. T. Hallowes, H. E. Jones, H. R. Kempe, F. Legge, J. Love, R. Pearce, Sir Alex. Pedler, H. M. Ross, and J. Shaw.

The *British Medical Journal* announces the death on March 30, at sixty-two years of age, of Count Karl A. H. Mörner, professor and rector of the Royal Karolinska Medico-Chirurgical Institute, Stockholm. We learn that Count Mörner matriculated in 1872, and, after studying at Uppsala and Stockholm, qualified as a practitioner of medicine in 1884. Two years later his thesis on the pigments of melanotic tumours gained him the doctorate of medicine, and at the same time he was appointed professor of chemistry and pharmacy at the Karolinska Institute. In 1892 he was appointed rector of the institute in succession to Keys, and it was as the central figure of the institute that he was best known to the Swedish public. As rector he participated in drawing up regulations for the Nobel Prize Committees, and he was president of the Nobel Medical Committee.

We regret to learn that Major Alasdair C. B. Geddes, R.F.C., a young naturalist of great promise, eldest son of Prof. Patrick Geddes, of Dundee, was killed in action in France on April 19. Mr. Geddes was commissioned in 1915, and gained very rapid advancement. He was recently awarded the Military Cross. His naturally fine powers of observation, cultivated by a singularly varied and active education, stood him in good stead in the discharge of his military duties. Alasdair Geddes kept up the tradition of the wandering student, learning at Montpelier and Paris, as well as at Dundee and Edinburgh, accompanying Dr. W. S. Bruce to Spitsbergen and his father's town-planning exhibition to India. He was keenly interested in botany and zoology, but perhaps geography held his heart. He graduated B.Sc. in Edinburgh in 1914, and was awarded the Vans Dunlop scholarship as the most distinguished science graduate of his year. He was passionately fond of music and the open country, and had an extraordinary power of compelling affection. All sympathy will go to his parents, who are in India, where Prof. Geddes has been doing Government work for three years in connection with town-planning. Major Geddes was only twenty-five years of age.

Dr. S. Tolver Preston, whose death took place in March at the hospital at Altona, near which town he had resided for many years, was educated at the University of Aberdeen, and while serving his articles with a London firm of engineers was employed on one of the Atlantic cable ships. He soon after retired from the profession, and in 1875 published his "Theory of the Ether," in which he attributed the gravitational attraction between two bodies to the oscillations of their molecules, which interact with the ether and set it in oscillation in turn. From about this period he appears to have lived abroad, chiefly in Germany, and in 1894 took his doctor's degree at Munich with a dissertation on the theories of gravitation. During this period he wrote several papers dealing with the kinetic theory of gases. He was the first to point out the possibility of obtaining work from a porous piston, separating hydrogen and oxygen at the same pressure from each other in a cylinder, by the more rapid diffusion of the hydrogen through the piston. Later papers dealt with cosmical physics. In one he pointed out that a rotating plastic solid would take a planetary form, and that it is not necessary to assume that the planets have at any time been liquid or gaseous.

Dr. George Christian Hoffmann, formerly assistant director, chemist, and mineralogist of the Geological Survey of Canada, died in Ottawa on March 8. From an obituary notice contributed to *Science* by Dr. H. M. Ami, we learn that Dr. Hoffmann was born on June 7, 1837, in London, and studied at the Royal School of Mines. He spent several years as chemist in research laboratories of England, and later worked in Natal, Mauritius, and Australia. In 1872 he joined the technical staff of the Geological Survey of Canada, Montreal, under Dr. Alfred R. C. Selwyn. He was a fellow of the Institute of Chemistry, of the Royal Society of Canada, and of many other distinguished bodies. While in Australia he devoted considerable time in the phyto-chemical laboratory attached to the Melbourne Botanic Garden in Victoria; inquiries into the tanning properties of the barks of native trees; investigation into the amount of potash in various indigenous trees, besides experiments in reference to various acids, tar, and other products. His bibliography contains valuable reports and papers of analyses and determinations of Canadian ores, minerals, and economic products characterising the rock formations of Canada and elsewhere, including rare and new species.

We regret to learn from the *Revue générale des Sciences* of the death of M. Henri Bazin Born at Nancy in 1829, M. Bazin was among the earliest of modern investigators into the phenomena of hydraulics, and his name is inseparably associated with the mathematical enunciation of the laws of fluid flow. In collaboration, at Dijon, with his chief and colleague, M. Darcy, and later, on the premature death of the latter, alone, he engaged in the preparation of a monumental memoir dealing with the flow of water in open channels and with the movement of waves. This was completed after seven years' labour, submitted to the Académie des Sciences, and published in 1865. It was his best and most prized work, and he returned to the subject again and again. In 1886, whilst still engaged at Dijon, he commenced experimental observations in connection with weirs, which lasted over a period of ten years. The results appeared in a series of communications to the *Annales des Ponts et Chaussées*. Nor did he content himself with applied science alone; in 1868 he found time to translate Salmon's treatise on algebra. Bazin enjoyed a great and well-deserved reputation as an experimentalist of the first rank; he was patient, indefatigable, and thorough. The science of hydraulics, in the noteworthy development which it has undergone during the past fifty years, is indebted to him for careful and painstaking explanations of many of those contradictory features in hydraulic phenomena which are the despair of the engineer, and render it so difficult to reconcile satisfactorily the results of theoretical calculation with actual observation.

The newly formed Russian Botanical Society held its annual, and also a special, meeting at Moscow on December 16–19, 1916, and its organisation was then completed. The following officers were elected: *Honorary President,* A. S. Famincyn; *President,* I. P. Borodin; *Vice-Presidents,* V. I. Palladin and S. G. Navašin; *Chief Secretary,* N. A. Buš; *Treasurer,* V. N. Suchačev; *Members of the Council* in Petrograd, V. L. Komarov, S. P. Kostyčev, and V. A. Tranšel. In addition, the following were elected on the council as representing cities containing a minimum of five members of the society: M. I. Golenkin (Moscow), E. F. Votčal (Kiev), V. M. Arnoldi (Charkov), B. B. Grineveckij (Odessa), V. V. Sapožnikov (Tomsk), Ja. S. Medvědev (Tiflis), and V. M. Arcichovskij (Novočerkassk). The number of the acting members of the society now exceeds 280. Notwithstanding the present unfavourable conditions, more than eighty members attended the four days' meeting in Moscow, and, in addition to the discussion and settlement of various questions of organisation, sixteen scientific reports were read. The next extraordinary meeting is fixed for December, 1919, again in Moscow. Thanks to a subsidy of 3000 roubles received from the Ministry of Public Instruction, it was possible towards the end of the year 1916 to proceed with the publication of the Journal of the Russian Botanical Society, and the first issue (Nos. 1–2) was placed before, and approved by, the Moscow meeting. The second issue (Nos. 3–4) is in the press and finishes the year 1916. For this year a subsidy of 10,000 roubles is being applied for, and it is intended to publish eight numbers of four to five sheets each. Thus the scientific amalgamation of Russian botanists, for which they have long striven, may be considered as achieved, and the formation under the auspices of the Imperial Academy of Sciences of the first all-Russian learned society is an accomplished fact.

In the Journal of the Royal Anthropological Institute (vol. xlvi., July–December, 1916) Sir James Frazer's Huxley memorial lecture, "Ancient Stories of a Great Flood," is published. This subject was suggested by Huxley's article, "Hasisadra's Adventure" ("Collected Essays," vol. iv., London, 1911). He deals first in detail with the Babylonian and Hebrew versions of the story, and then passes on to consider the Greek myth of Deucalion. In regard to the last, he advances the interesting suggestion that the cleft in the Thessalian mountains, which is said to have been rent by Deucalion's flood, was no other than the gorge of Tempe. Indeed, it seems probable that the story of this flood was suggested by the desire to explain the origin of this deep and narrow defile. If this conjecture be accepted, the Thessalian story of Deucalion's flood, like that of Samothrace based on the tradition of the vast Ponto-Aralian sea and its desiccation through the piercing of the dam which divided it from the Mediterranean—in other words, through the opening of the Bosphorus and the Dardanelles—was an inference drawn from the facts of physical geography. In short, both were what Sir Edward Tylor has called "myths of observation" rather than historical traditions.

In the *Review of Applied Entomology* (vol. iv., A and B, parts xi. and xii.; vol. v., A and B, parts i. and ii.) useful summaries of recent papers continue to be published. Those extracted from Russian and Scandinavian sources will be especially valued by British workers with a limited linguistic aptitude.

Dr. Angel Gallardo continues his studies of ants in the *Anales del Museo de Historia Natural de Buenos Aires* (vol. xxviii.), contributing systematic notes on the Attinæ of the Argentine, and a special illustrated account of *Trachymyrmex pruinosus*, with descriptions of observation nests.

Two recent numbers of the *Bulletin of Entomological Research* (vol. vii., parts ii. and iii.) are noteworthy for some further papers by the Rev. Jas. Waterston on tropical chalcids; some of the new forms described are parasitic on injurious scale insects. There are also valuable papers by Dr. J. W. Scott Macfie on "West African Mosquitoes," of which one on the changes observed in the four larval stages of *Stegomyia fasciata* is of general interest to entomologists; the author points out the practical importance of trustworthy characters for the determination of such disease-carrying insects in the larval stage.

A very useful pamphlet on the destruction of the rodent pests of the farmer has been issued by the U.S. Bureau of Biological Survey. The rodents of North and Middle America include about 1350 forms; but of this number only a few species are actually troublesome to the farmer. When these pests become unduly numerous trapping is found impracticable, and the use of poison has to be resorted to. Careful instruction as to the employment of this is given. But the protection of hawks and owls, as well as of non-venomous snakes, is strenuously advocated. A number of photographs afford the reader a vivid idea of the widespread havoc these creatures may cause, if allowed to increase unchecked. British farmers might read these pages with profit.

In the *Journal of the Franklin Institute* for March Prof. Ulric Dahlgren contributes a further instalment of his studies on the "Production of Light by Animals." He treats now of the Lampyridæ, known in this country as "glow-worms," but which Prof. Dahlgren calls "fire-flies," a term reserved by British coleopterists for another family, the Elateridæ. Both larval and adult forms are described in regard to their powers of luminescence, and the suggestion is made that the light-producing powers are dependent on the tracheæ, controlled by the nervous system, a conclusion already arrived at by Wielowiejski, of whom he makes no mention. Nor is the work of Dubois, who studied the luminescence of the true fire-flies, referred to. The last-named author believed that the light was evoked by the emission of blood, charged with "luciferine," to the luminous organs, where it combined with "luciferase," an enzyme formed in the luminous organs themselves.

The current number of the *Quarterly Journal of Microscopical Science* (vol. lxii., part ii.) contains an interesting paper by Dr, S. F. Harmer on that hitherto very imperfectly known member of the British marine fauna, *Phoronis ovalis*. This species was described so far back as 1856 by Strethill Wright, in the same papers in which the genus Phoronis was first established, a genus which has since given rise to an immense amount of discussion on account of its very problematical relationships. Curiously enough, up to the date of publication of Dr. Harmer's memoir, the species in question had never again been recorded, and considerable doubt had been thrown upon its validity. Its mode of life, rather than its rarity, is probably responsible for its having escaped re-discovery for more than half a century, for it inhabits burrows in the shells of mollusca, along with numerous boring animals, such as Cliona and Polydora. The original specimens came from the Firth of Forth, those examined by Dr. Harmer from the Northumberland coast. A detailed description of the anatomy is given, with numerous illustrations, and stress is laid upon the striking powers of regeneration and multiplication by transverse fission. It is suggested that *Actinotrocha pallida,* found at Heligoland and Wimereux, is the larval form of *Phoronis ovalis.*

The trustees of the British Museum have just issued the fourth report on Cetacea stranded on the British coasts. This is the work of Dr. S. F. Harmer, the keeper of the department of zoology in the British Museum (Natural History), and contains the records for 1916. In his preface Dr. Harmer tells us that the number of stranded Cetacea reported has continued to be adversely affected by the war, but it has reached twenty-nine, which is one more than in 1915. With the exception of a Sowerby's whale, from Lincolnshire, all the most interesting specimens have been obtained from the western, or south-western, coasts of England, Scotland, and Ireland. The value of these reports is beyond dispute, and it increases annually, since by the accumulation of such records an immense amount of material will become available, both as to the character of the Cetacean fauna of our seas and in regard to the migrations of these animals. Already it has become apparent that Cuvier's whale (*Xiphius cavirostris*) is not, after all, a very rare visitor to our seas, and what seems to be the first record of a specimen of this species recorded from the English coast is registered in this report. It was stranded in June last, at Watergate, Cornwall. A Sowerby's whale (*Mesoplodon bidens*) from Lincolnshire, a white-sided dolphin (*Lagenorhynchus acutus*) from Co. Mayo, and a young sperm whale (*Physeter catodon*), with uncut teeth—apparently a "sucker"—from Co. Galway, are other subjects of importance in this report. Finally, mention must be made of the stranding of a huge grampus, *Orca orca,* in the Solway Firth in May last. The flippers of this animal were of enormous size, and have been secured for the museum, where they have been dissected and casts, for exhibition purposes, have been made from them. They show many surprising structural peculiarities, which are to be described in detail in the near future.

Mr. W. Bickerton, in the Transactions of the Hertfordshire Natural History Society (vol. xvi., part iii.), records some interesting facts about the feeding habits of the greater and lesser spotted woodpeckers, which, during the months of December, January, and February, haunt osier-beds for the sake of feeding on the larvæ of some small fly which lives in burrows in the stems of willow twigs. To obtain these the bark is stripped from the twigs, enabling the larva to be extracted by the invader's tongue. So far the species to which this larva belongs is not known, but the authorities of the British Museum (Natural History) are said to be investigating the matter, from materials supplied by Mr. Bickerton. He believes that in this habit of bark-stripping we have an indication of the significance of the extreme density of the horny sheath of the woodpecker's beak. That is to say, this is not due in the first place to the needs of hewing tunnels through sound wood to secure a nesting-hole in hollow trees. Two other papers in this number will repay careful perusal. One of these is on the "Hertfordshire Bourne in 1916," by Mr. John Hopkinson, the other on the "Satyrid Butterflies of Hertfordshire," by Mr. A. E. Gibbs.

The Cotteswold Naturalists' Field Club, with the assistance of the Rev. H. I. Riddelsdell, is making good progress in the collection of material for the compilation of the flora of Gloucestershire. As an instance of the new material collected up to the present, it may be noted that the chairman of the committee, the Rev. Walter Butt, announces, in vol. xix., part ii. of the Proceedings, that a collection of violets from the county was sent to Mrs. Gregory, of Cambridge, the leading authority on this flower, with the result that twelve new varieties were established for Gloucestershire, including, it is believed, *Viola rupestris,* Schmidt, the rarest violet in Great Britain, hitherto found only in Teesdale. Mr. Charles Bailey, who has recently presented his splendid herbarium to the Manchester University, has examined the list and describes it as "amazing."

The Danish Meteorological Institute has published its annual survey of the state of the ice in Arctic seas for 1916. The publication, as usual, is in both Danish and English, and is supplied with charts for every month from April until August. No observations for the year were received from the Bering Sea, Beaufort Sea, north of Siberia, or Hudson Bay. Information is also wanting for he Kara Sea, despite the fact that a British steamer crossed it last summer. The abnormal conditions of the Spitsbergen ice, already noted in Nature, were closely related with the conditions in the Barents Sea. After an abnormal westward extension of the ice, the pack receded in April almost to the coast of Novaya Zemlya, but advanced again in May and June. Even in June there was ice in the White Sea, and it was not until August that the Barents Sea was clear of ice to Nova Zembla and Hope Island. On the other hand, Iceland was unusually free of ice throughout the year, except during June and July. The Danish Meteorological Institute has also issued, as a separate publication, a useful summary of the ice conditions for the last twenty-one years in the Kara, Barents, Greenland, and Bering Seas, Davis Strait, and Baffin Bay. Charts are included for the months from April to August, showing the average limits, together with the maximum and minimum limits of the ice, and tables are given of the ice-covered area in the Barents and Greenland Seas for each of those months throughout the series of years.

According to a paper published in the *Bulletin des usines de guerre,* the change in volume produced by hardening (quenching) steel is small if the hardening temperature is kept below a certain limit. Hardening in oil gives less variation in volume than hardening in water. Special metals, such as nickel-steel, show less diminution in volume than the carbon-steels. Eutectic steels "crack" more frequently than carbon-steels, which latter undergo considerable changes of volume. Finally, from experiments carried out, in flat pieces the tension is distributed uniformly in every direction, while in cylindrically shaped pieces the ends contract and become hollow, the piece bellying out.

Dr. John Aitken's well-known papers on "Dust, Fogs, and Clouds" and on "Dew," originally published in the Transactions of the Royal Society of Edinburgh (1880, 1887), have been re-issued as one pamphlet by the council of the Royal Society of Edinburgh. The steady demand by the scientific world for copies of these papers having almost exhausted the parts of the Transactions in which they were published, the council felt it a duty to reprint them together as one pamphlet with the original paging. The importance of these papers has long been recognised by all workers in meteorology. They form together a pamphlet of ninety quarto pages, and copies may be obtained through the society's publishers, Messrs. Robert Grant and Son, 107 Princes Street, Edinburgh, and Messrs. Williams and Norgate, 14 Henrietta Street, Covent Garden, London, W.C.2, at a cost of 7*s.* 6*d.*

IN *Scientia* for January Mr. Philip E. B. Jourdain discusses the function of symbolism in mathematical logic. He maintains that until comparatively recently, symbolism in mathematics and the algebra of logic had the sole aim of helping reasoning by giving a fairly thorough analysis of reasoning and a condensed form to the analysed reasoning, which should, by suggesting to us analogies in familiar branches of algebra, make mechanical the process of following the thread of deduction; but that, on the other hand, a great part of what modern mathematical logic does is to increase our subtlety by emphasising "differences" in concepts and reasonings instead of "analogies." He points out the confusion of thought which has led many to believe that mathematical logic seeks to displace the free spirit of discovery or invention in mathematics, and the misunderstanding of the particular form of "economy of thought" used throughout mathematics and symbolic logic. He then deals with the function of this kind of economy and the necessity of observing the distinction between logic and psychology, and concludes by sketching some of the results of modern mathematical logic.

WE have received from the Cambridge Scientific Instrument Company List 134, which describes a measuring microscope for workshop use which can be arranged to measure horizontal or vertical lengths up to 4 cm. with an accuracy of 0·0001 cm. List 191 describes a thermo-couple potentiometer capable of reading up to 90 millivolts with an accuracy of a microvolt. List 912 describes the various forms of recording and index thermometers reading up to 540° C. They depend on the expansion of mercury enclosed in a steel bulb, a fine bore flexible steel tube, and a Bourdon spiral which actuates the pointer of the direct reading or the pen of the recording form of instrument.

"CHEMISTRY and Technology of Oils and Fats," P. J. Fryer and F. E. Weston, and "Naval Architecture," J. E. Steele, are in the press for appearance in the *Cambridge Technical Series* (Cambridge University Press). The following works are in preparation for inclusion in the same series: "Architectural Building Construction," W. R. Jaggard and F. E. Drury, vols. ii. and iii.; "Electrical Engineering," Dr. T. C. Baillie, vol. ii.; "Automobile Engineering," A. G. Clark; "Electro-Technical Measurements," A. E. Moore and F. Shaw; "Paper: Its Uses and Testing," S. Leicester; "Mining Geology," Prof. G. Knox and S. Ratcliffe-Ellis; "Textile Calculations—Materials, Yarns, and Fabrics," A. M. Bell; "Laboratory Note Book for Applied Mechanics and Heat Engines," F. Boulden; "Elements of Applied Optics," W. R. Bower; "Electric Installations," C. W. Hill; "Accounting," J. B. Wardhaugh; "Chemistry for Textile Students," B. North and N. Bland; "Dyeing and Cleaning," F. W. Walker; "Experimental Building Science," J. L. Manson, vol. ii.

OUR ASTRONOMICAL COLUMN.

PERSISTENT AURORA.—By taking advantage of the sensitive spectroscopic method of detecting faint aurora, Dr. V. M. Slipher has obtained further evidence of a permanent illumination of the night sky by auroral light (*Popular Astronomy*, vol. xxv., p. 274). A large percentage of the luminosity is concentrated in the yellow-green line about $\lambda 5572$, and exposures of only a few hours were sufficient to give impressions with the small spectrograph employed. From June, 1915, to November, 1916, upwards of fifty exposures were made at Flagstaff on different parts of the sky, and the characteristic line appeared in all the photographs. The observations suggest that the auroral light is more intense towards the horizon, and possibly towards the sunrise and sunset points of the sky, but more extensive observations are necessary in this connection.

A NEW CATALOGUE OF DOUBLE STARS.—An important catalogue of the double stars discovered visually since 1905 has been published as vol. lxi. of the Memoirs of the Royal Astronomical Society. The author is Mr. Robert Jonckheere, a well-known observer of double stars, who was director of the observatory of the University of Lille until the events of the war drove him to England as a refugee in October, 1914. The exile thus abruptly forced upon him has given Mr. Jonckheere the opportunity of completing the present catalogue. Most of Mr. Jonckheere's own observations were made at Lille with an equatorial refractor of 14-in. aperture, but since his arrival in this country he has made extensive use of the 28-in. refractor at Greenwich. The catalogue, however, is not exclusively devoted to the author's discoveries and measurements. It includes all the double stars to the year 1905 which were not included in Burnham's general catalogue of 1906, and all the pairs discovered from that date to the end of 1916, the term "double star" here being applied only to those of separation less than 5″. The limit of N.P.D. is 105 , and the positions are given for the epoch 1920. The total number of entries is 3950. The catalogue is conveniently planned, and will doubtless greatly facilitate the work of double-star observers.

REPORT OF MOUNT WILSON OBSERVATORY.—Prof. Hale's report on the work at Mount Wilson during 1916 records new and significant advances in several departments, many of which we have already noted. The first place is naturally given to the spectroscopic method of determining the distances of stars, which is now considered to be established as a fundamental contribution to practical astronomy, and has already afforded valuable confirmation of the conclusions of Russell and Hertzsprung regarding the existence of giant and dwarf stars. Scarcely second in interest is the investigation of periodic spectral changes in the Cepheid variables, which must have a significant bearing upon the interpretation of stellar types as well as upon the nature of the variables of this class.

The use of the new 13-ft. spectroheliograph has revealed the vortex structure about sun-spots in exquisite detail, and certain other investigations have suggested that the forms recorded represent hydrodynamic phenomena rather than lines of force of the magnetic fields underlying the spots. No trustworthy evidence of the Stark effect in the sun has yet been obtained, but further work on the general magnetic field of the sun has confirmed the conclusion that the magnetic axis does not coincide with the axis of rotation; it is inclined at an angle of 5·2°, and revolves in a period of 31·51 days ± 0·62 day. A new map of the sun-spot spectrum has been completed for the region $\lambda 6450$ to $\lambda 6000$, and the large scale of 1 cm. to the Ångström is sufficient to show the chief Zeeman phenomena.

Important results have also been obtained in studies of star clusters and nebulæ, and in laboratory investigations.

Good progress has been made with the 100-in. reflector, and it is hoped that this giant instrument will be in actual use in the near future.